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INTERNATIONAL TRANSFER OF TECHNOLOGY: AN AGENDA OF NATIONAL SECURITY ISSUES

PREPARED FOR THE
SUBCOMMITTEE ON INTERNATIONAL SECURITY
AND SCIENTIFIC AFFAIRS

OF THE
COMMITTEE ON
INTERNATIONAL RELATIONS
U.S. HOUSE OF REPRESENTATIVES

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FOREWORD

HOUSE OF REPRESENTATIVES,
COMMITTEE ON INTERNATIONAL RELATIONS,
Washington, D.C., February 13, 1978.

During the course of the Committee on International Relations' consideration of legislation to authorize U.S. security assistance programs for fiscal year 1978, the complexities involved in the transfer of technology demonstrated the need for a thorough review of U.S. technology transfer policy. Subsequently, the Congress enacted section 24 of the International Security Assistance Act of 1977 requiring a Presidential study of technology transfer policy. Among the questions to be studied are the following:

- The economic and social impact of the transfer of technology on the recipient countries;
- Impact on the economies of the recipient countries of restrictions on the transfer of dual purpose technologies (technologies with civilian and military applications);
- Impact of the restriction on the transfer of dual-purpose technologies on the military capabilities of potential adversaries;
- Effect of the transfer of technology on the U.S. economy and on U.S. international competitiveness; and
- Advantages and disadvantages of U.S. participation in international scientific and technological activities.

The committee's hearings, studies prepared by the Congressional Research Service of the Library of Congress, and reports to the Congress by the U.S. General Accounting Office uncovered several weaknesses in U.S. transfer policy and procedures, interagency coordination, and analysis of objectives supporting programs and practices of the executive branch. Furthermore, it became clear that the executive branch had difficulty in explaining its policy in a clear and understandable way.

The Congress mandated under section 24 of the International Security Assistance Act of 1977 a comprehensive Presidential study of U.S. Government policies and practices with respect to the national security and military implications of international transfers of technology. The congressional intent in mandating this study is to obtain information necessary to understand the many complex issues relating to technology transfer, and, if necessary, to consider appropriate changes in legislation governing international transfers of technology.

At my request, the Congressional Research Service of the Library of Congress has prepared a study of the issues raised in section 24 of the International Security Assistance Act of 1977. The purpose of the CRS study is to identify further the range of issues and problems relating to international technology transfer. Hopefully, this study will be helpful to participants in the President's technology transfer

policies and programs review in identifying issues and questions that would be appropriate agenda items for the Presidential study. It is expected that the information needed to answer the questions posed in the study will be included in the President's report due to be submitted to the Congress no later than August 4, 1978.

The observations and analyses in this report are those of the authors and do not necessarily reflect the views of the members of the Committee on International Relations. It is hoped, however, that this study will assist the committee, Members of Congress, and the general public in understanding the complex issues involved in the international transfer of technology.

CLEMENT J. ZABLOCKI,
Chairman.

LETTER OF SUBMITTAL

LIBRARY OF CONGRESS,
CONGRESSIONAL RESEARCH SERVICE,
Washington, D.C., February 13, 1978.

HON. CLEMENT J. ZABLOCKI,
*Chairman, International Relations Committee,
House of Representatives, Washington, D.C.*

DEAR MR. CHAIRMAN: In your letter of August 2, 1977, requesting the assistance and support of the Congressional Research Service on the subject of international technology transfer, you asked us among other things to conduct a study outlining the issues identified in section 24 of the International Security Assistance Act of 1977. The attached report, designed to fulfill this portion of your request, is the product of the ideas and efforts of numerous individuals and extensive coordination and liaison under the direction of John Hardt, Associate Director for Senior Specialists in CRS.

In August, upon receipt of your request, a working group on technology transfer was formed among the congressional support agencies with John Hardt as the coordinator and Claire Geier (Science Policy Research Division) and Robert Shuey (Foreign Affairs and National Defense Division) sharing the duties of the rapporteur. The primary CRS analysts and specialists assisting in the preparation of the report were, in addition to those above, George Holliday of the Economics Division; Jim Wootten, Vita Bite, and Ted Galdi of the Foreign Affairs and National Defense Division; Walter Hahn, Genevieve Knezo, and Wendy Schacht of the Science Policy Research Division; and Frank Huddle, Warren Donnelly, Charles Gellner, Ronda Bresnick, and William Inglee of the Senior Specialist Division. A complete list of participating CRS staff members is provided.¹ Forrest Frank and Ivo Spalatin furnished essential guidance during the preparation and coordination of successive drafts.

After your letter was sent to the relevant executive agencies asking for their cooperation in this matter, a preliminary draft of this report was circulated in late October to the Departments of State, Defense, and Commerce, the Arms Control and Disarmament Agency, the National Science Foundation, and the Office of Science and Technology Policy (the executive branch agencies which are required by Public Law 95-92 to participate in the preparation of the President's report to Congress on the military and national security implications of international technology transfer). Representatives of those agencies, as well as staff members of your committee, the Senate Banking Committee, the Senate Committee on Commerce, Science, and Transportation, and the congressional support agencies, were invited to attend a discussion of the reporting requirement and the CRS draft report on November 2 at the Library of Congress. The meeting was

¹ See Appendix 2, p. 27.

well attended and a number of comments were submitted by officials of the various agencies. Those remarks and contributions were taken into account in preparing this report.

The attached document identifies most of the major issues involved in the military and national security implications of international technology transfer. We believe that it will constitute a useful first stage survey in the committee's pursuit of policy perspectives in the area of national security and technology transfer.

Sincerely,

GILBERT GUDE,

Director, Congressional Research Service.

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SETTING FOR THE ISSUE AGENDA

The International Security Assistance Act of 1977 (Public Law 95-92) signed into law by President Carter on August 4, 1977, required a number of executive branch agencies to undertake a study on the national security and military implications of international technology transfer. The study is to be completed by August 4, 1978, as noted in section 24 of the act:

STUDY OF TECHNOLOGY TRANSFERS

SEC. 24 (a) The President shall conduct a comprehensive study of the policies and practices of the United States Government with respect to the national security and military implications of international transfers of technology in order to determine whether such policies and practices should be changed. Such study shall examine—

- (1) the nature of technology transfer;
- (2) the effect of technology transfers on United States technological superiority;
- (3) the rationale for transfers of technology from the United States to foreign countries;
- (4) the benefits and risks of such transfers;
- (5) trends in technology transfers by the United States and other countries;
- (6) the need for controls on transfers of technology, including controls on the use of transferred technology, the effectiveness of existing end-use controls, and possible unilateral sanctions if end-use restrictions are violated;
- (7) the effectiveness of existing organizational arrangements in the Executive branch in regulating technology transfers from the United States;
- (8) the adequacy of existing legislation and regulations with respect to transfers of technology from the United States; and
- (9) the possibilities for international agreements with respect to transfers of technology.

(b) In conducting the study required by subsection (a), the President shall utilize the resources and expertise of the Arms Control and Disarmament Agency, the Department of State, the Department of Defense, the Department of Commerce, the National Science Foundation, the Office of Science and Technology Policy, and such other entities within the Executive branch as he deems necessary.

(c) Not later than the end of the one-year period beginning on the date of enactment of this section, the President shall submit to the Congress a report setting forth in detail the findings made and conclusions reached as a result of the study conducted pursuant to subsection (a), together with such recommendations for legislation and administrative action as the President deems appropriate.

The purpose of this paper is to assist in identifying the issues implied by the nine questions in section 24 of the act. At several workshops at the Congressional Research Service, it became clear that several concepts needed special clarification:

1. The distinction between military and national security;
2. The major areas of technology transfer, e.g., North-South, West-West, West-OPEC, and East-West; and
3. The means by which technology transfer occurs.

In clarifying each of the concepts it is also important to indicate the sense of priority expressed in the Congress and the Executive, as appropriate, in regard to these three concepts.

ON NATIONAL AND MILITARY SECURITY

The concepts of national security and military security require clarification at the outset of this study as they are often used interchangeably but in fact hold different meanings. In this study, national security encompasses all factors including military defense, the maintenance of access to economic resources vital to the economy, the general conduct of foreign relations, and all other factors necessary to the maintenance of the governmental and social system of the United States. Military security, on the other hand, refers solely to the protection of the United States against physical attack.

Discussions within the International Relations Committee suggest that broad political and economic factors—national security factors—equal or transcend military security considerations in the assessment of international transfer of technology. This view appears consistent with the position of President Carter in his energy speech to the Nation on November 8, 1977.

Our national security depends on more than our armed forces. It also rests on the strength of our economy, on our national will, and on the ability of the United States to carry out our foreign policy as a free and independent nation. America overseas is only as strong as America at home. [Italic added.]

FOUR MAJOR AREAS OF TECHNOLOGY TRANSFER

Congressional interest was addressed to economic, political, and military aspects of Western nations' relations with OPEC and among themselves on transfer of technology, that is, West-West relations; interest in East-West relations followed these other areas in interest.

The congressional interest in a broad geographic range of technology transfers appears to be consistent with the administration's views, as expressed by the President's assistant for national security, that separate policies must be developed for the three major areas.¹

In the 1960's, world affairs were dominated by growing diversity in the Communist world and by a competitive relationship between the United States and the Soviet Union. * * *

This should no longer be, or need be, the case. East-West relations, notably U.S.-Soviet relations, involve and will continue to involve elements of both competition and cooperation. We are quietly confident about our ability and determination to compete, economically, politically, and militarily. But managing a relationship that will be both competitive and cooperative cannot be permitted to dominate all our perspectives. *Today, we do not have a realistic choice between an approach centered on Soviet Union, or cooperation with our trilateral friends, or on North-South relations.* Indeed, each set of issues must be approached on its own terms. A world where elements of cooperation prevail over competition entails the need to shape a wider and more cooperative global framework. [Italic added.]

MEANS OF TECHNOLOGY TRANSFER

Recent interest of the House International Relations Committee in the U.S.-U.S.S.R. Science and Technology Exchange Agreement illustrated the breadth of perspective in assessing technology transfer. The training of scientists, multilateral and bilateral governmental, business, and academic exchanges all are judged relevant mechanisms for technology transfer assessments, as are the exports of advanced machinery, industrial processes, and technological know-how.

¹ Dr. Zbigniew Brzezinski's remarks to the Trilateral Commission in Bonn, Federal Republic of Germany on Oct. 25, 1977.

The emphasis on people and systems in the effectiveness of transfer was also stressed by the Department of Defense Science Board study, "An Analysis of Export Control of U.S. Technology—A DOD Perspective" (the "Bucy Report"). The general thrust of Government interest, expressed in the Congress and in executive agencies in defining technology transfer for purposes of the legislative mandate for the study, is to prescribe the broader definitions of national security, identify the means of technology transfer, and to reevaluate U.S. policy priorities and concerns regarding transfers to the world's major geopolitical areas. Therefore, in this study, the broader aspects are given more, rather than less, priority than the narrower concepts of military, West-East, and product-process transfer in evaluating U.S. policy and procedures.

INTERNATIONAL SECURITY ASSISTANCE ACT OF 1977 TECHNOLOGY TRANSFER STUDY TOPICS AND ISSUES

Topic 1: The Nature of Technology Transfer

ISSUES

1. Definition of Technology and Technology Transfer.¹

"Technology" encompasses all basic and applied research, all Edisonian inquiry, all manufacture and use of products, all knowledge rationally applied to agriculture, biomedicine, applications of sociology and other behavioral sciences, and any other rational human actions toward intended results.

"Technology" is defined in the Merriam-Webster Dictionary, 2d edition, as follows:

(1) Industrial science; the science or systematic knowledge of the industrial arts, esp. of the more important manufacturers, as spinning, weaving, metallurgy, etc.

(2) Terminology used in arts, sciences, or the like.

(3) Any practical art utilizing scientific knowledge, as horticulture or medicine; applied science contrasted with pure science.

(4) Anthropol. Ethnotechnics.

The Merriam-Webster Dictionary, 3d edition, defines technology as follows:

(1) The terminology of a particular subject: technical language:

(2) a: the science of the application of knowledge to practical purposes: applied science; b (1) the application of scientific knowledge to practical purposes in a practical field: (2) a technical method of achieving a practical purpose: (3) the totality of the means employed by a people to provide itself with the objects of material culture.

The complex and incompletely understood process of "technology transfer" involves communication in which the message contains technological elements. The transfer can be vertical (i.e., successive transmissions of ideas cumulatively toward a complete design or process) or horizontal (from one user to another). Either kind of transfer can be intranational or international.

Information transfer is essential, but not sufficient by itself, for successful technology transfer to take place. Information transfer per se. is not technology transfer. Technology transfer is not a value-free process. It is initiated, operated, accelerated, hindered, or curtailed by many diverse factors.

Technology transfer is by agents not agencies, and people both make barriers to the transfer of technology and make them permeable.

¹ Abstracted from U.S. Congress, House Committee on Science and Technology, *Science Policy: A Working Glossary* (Washington, D.C., U.S. Government Printing Office, 1976), pp. 88-89; and "Summary" Walter Hahn and Susan Doscher, "Summary" in Marvin J. Cetron and Harold F. Davidson, eds., *Industrial Technology Transfer: Proceedings of the NATO Advanced Study Institute on Industrial Technology Transfer* (Leyden: Noordhoff, Leyden, 1977), pp. 429-469, especially pp. 431, 439.

Technology transfer is a process involving real people at both the source and user ends. Technology transfer focuses on the process, not on the substantive technology per se.

"Appropriate technology", in the context of discussions on North-South economic relations is that technology especially, but not exclusively, low and medium technology, designed to meet the indigenous technical skills, educational and employment capabilities; natural, industrial, and financial resources; and the material, economic, and social needs of the recipient.

2. International technology transfers encompass a broad spectrum of transactions such as training of foreign nationals (whether in low-level agricultural technology or in nuclear physics), display of U.S. products at trade exhibits, exchange of knowledgeable people, description of products and production techniques in commercial literature, sale of complex weapons systems or machinery, licensing of high-technology production systems, furnishing turnkey factories and research facilities, and providing personal technical services to accompany transfers of hardware and systems. The important task raised by Public Law 95-92 is to identify types and conditions of international technology transfer that are of particular significance to U.S. national interests and military security. Related considerations are whether the technology to be transferred is "revolutionary"; i.e., involving major or breakthrough type change; whether it will significantly improve the recipient's economic, technological, or military potential in ways detrimental to U.S. military security; whether it involves an item of significant military equipment; whether it is related to a lethal or nonlethal system, or to an offensive or defensive military system. Existing methods are inadequate for recording flows of technology and for measuring the effectiveness of technology transfer mechanisms, and the economic, political, and security implications of various transfers.

How are international technology transfers recorded? What international technology transfers have significant direct or indirect implications on U.S. national interests and what are the most meaningful and useful measurements of these transfers and their implications?

3. It has been asserted that whether public or private, technology transfer mechanisms are characterized in terms of the following features:

- (1) Scope—bilateral versus multilateral;
- (2) Function—whether the transfer aims at:
 - (a) acquiring a new capability (R. & D.);
 - (b) making effective use of an existing capability (operation);
 - (c) coping with the consequences of the use of a capability (regulation);
- (3) Instrumentality—whether the transfer calls for:
 - (a) coordination of independent policies;
 - (b) joint facilities;
 - (c) a common policy integrating specific policies; and
 - (d) a fully unified policy substituting for independent policies.²

² Henry Nau, "Technology Transfer, and U.S. Foreign Policy" (New York; Praeger, 1976), p. 13.

Does this or another typology capture the essential elements of any technology transfer?

4. The importation of foreign technology and the accompanying release of civilian resources for use in military programs may benefit incrementally the military capability of the recipient.

Under what circumstances does civil technology transfer make a significant contribution to the military potential of the recipient country? What is the acceptable risk when trading advanced technology to a potential adversary? If a nation's military outlays are routinely accorded preference regardless of technology imports, is the releasing effect really significant for the military sector? Is it offset by a countering resource demanding effect?

5. The U.S. Government controls some technology which it can use to achieve foreign policy goals. However, much American technology is protected by the proprietary rights of private individuals, corporations, and institutions and therefore is not freely available to foreign policy decisionmakers.

What is the nature and extent of technology in the public domain, under the control of the Government, and, conversely, in the possession of private proprietary concerns? What is the extent of involvement of each of these three sectors in the transfer of technology?

Topic 2: The Effect of Technology Transfers on U.S. Technological Superiority

ISSUES

1. The advantageous technological position which the United States has held for many years is said to be eroding. One of the reasons offered for this alleged decline is that U.S. policy allows foreign competitors too easily to acquire America's technology, and adapt it for their own industrial and research programs. The foreign country thereby produces the end items, develops the product improvements and spinoffs, and, in some cases, is able to surpass the United States in a particular technology. On the other hand, the export of technology can enhance the U.S. technological and trade position with respect to other countries if the earnings from the export and sale of U.S. technology are applied to further U.S. research and development and bring other countries the income with which to increase their imports of U.S. goods and services.

Is U.S. technological superiority declining? What is the nation's status? What are the key measures of that status?

Is there a positive or negative correlation between the status and trends of U.S. advanced technology and the level, nature, and trends of its technology transfers? Are there verifiable cause and effect relationships?

Is U.S. military and industrial technological superiority over its allies and other friendly countries beneficial to U.S. national interests?

How can the life cycle of a particular technology be estimated? What factors affect the rate with which a nation can absorb technology and exploit it for further developments?

How can military related technology transfers have an impact on U.S. technological superiority? Could they increase the number of competitors for the United States in the long and short run? Could they affect U.S. unemployment through widespread increase in multinationals? Or will the technology transferred necessarily be behind the advanced level on which U.S. technological superiority now rests?

2. International arms and weapons transfers provide foreign countries with some of America's advanced military technology, the same equipment used by U.S. forces. There is a possibility that the technology embodied in this equipment could be copied, that countermeasures could be developed, or that the technology could be used as a steppingstone to develop advanced technologies.

Does the sale of advanced U.S. weapons systems and of associated support technology degrade U.S. military technological superiority?

3. It was concluded in the Bucy report³ that there is a wide spectrum in the effectiveness and potential danger of various transfer mechanisms in terms of their potential effectiveness in military applications.

Which forms or mechanisms of technology transfer are most detrimental to U.S. technological superiority? How do the deleterious effects vary with the type of technology being transferred and the nation to which the transfer is being made? How can key factors in technology development and critical aspects of technology transfer mechanisms be identified?

4. SALT I froze United States and Soviet ballistic missile inventories; the objective of SALT II is to begin a process of actual force reductions. SALT negotiators are also hopeful of gaining control over the qualitative arms race. If actual numbers are reduced and development is frozen but technology transfers to such major powers as China, France, Germany, Japan, and Britain are not controlled, the outright military superiority which distinguishes the United States and Soviet Union as superpowers may be eroded.

Is it likely that the diffusion of technology will seriously undermine the military superiority of the United States and the Soviet Union as the quantitative levels of United States and Soviet strategic inventories are reduced via the SALT process and qualitative advantages become increasingly salient? Should a future SALT agreement include a provision prohibiting or regulating transfers of strategic weapons and possibly other military technology to third countries? How would such a provision affect the security of the United States?

Topic 3: The Rationale for the Transfers of Technology From the United States to Foreign Countries

ISSUES

1. The current International Security Assistance Act implies that a substantial relationship exists between technology transfer and military security and that U.S. policy should facilitate transfers that benefit U.S. military security or other national interests and restrict those that are detrimental to those interests. However, the primary rationale in the United States for the transfer of technology has been commercial. Technology in the United States is predominately owned and transferred by the private sector rather than the Federal Government. Some technology transfers are encouraged or prohibited by the Government in the interest of national security. The difficulty in formulating a comprehensive technology transfer policy lies in establishing boundaries between governmental and commercial interests.

³ Defense Science Board Task Force, "An Analysis of Export Control of U.S. Technology—A DOD Perspective" (Washington, D.C.; Office of the Director of Defense Research and Engineering 1976), *infra*, p. 2.

What are the primary factors, including but not limited to national security factors, considered in shaping U.S. technology transfer policies? What concerns are foremost? What are the criteria used by the executive branch for establishing tradeoffs?

2. Some political scientists believe that by maintaining the dependence of foreign countries on the United States for weapons, spare parts, technical advice, and maintenance, this country gains influence over the policies and behavior of those states (costs and benefits are discussed under topic 4). Others suggest that military and industrial self-sufficiency of friendly countries increases the military capabilities of those countries and those of U.S. collective defense systems, and thereby enhances U.S. security.

Is the basic assumption that the United States by transfer of military weapons technology, enhances its national security interests by *promoting foreign dependence* on this country, or by *promoting military and industrial self-sufficiency* of friendly foreign countries?

3. Retransfer of U.S. technology to Eastern countries or other nations may result in applications of the technology in ways adverse to United States or other Western interests. This retransfer may also occur in third country transfers of technology supplied by Western nations other than the United States.

Given that there is little evidence of retransfer of U.S. technology to the East through third countries, what basis would there be for increasing U.S. controls on exports to other Western countries? Should studies be undertaken to trace third country transfers of technology originated in the United States?

4. Through aid and trade the North-South technological relationship involves both the United States and the U.S.S.R. and is therefore directly affected by the East-West relationship.

What is the nature of the Soviet military/scientific/technical/trade relationship with the developing nations? How does it impact on U.S. relations with the LDC's? In the military (arms and advisers) arena? In the civilian arena (consumer goods)? In production goods arena (machinery, etc.)?

Is the Soviet relationship with the LDC's in the several arenas competitive with the United States? To U.S. benefit? To U.S. detriment? How does the United States-Soviet science and technology interaction relate to and affect the U.S. position in the North-South relationship?

5. Coproduction or licensed production of entire weapon systems can make a country more independent of foreign suppliers, but arrangements which require the continued supply of technical assistance, complex subsystems, or materials from the United States can render the state economically dependent as well as militarily dependent on the United States. The sale of weapons also increases the recipient's military capability but, without the ability to produce spare parts, ammunition, and fuel, and independently to maintain the weapons, the recipient is dependent on the supplier to support its military operations.

Are U.S. military technology exports intended to increase or decrease foreign dependence on the United States? Under what conditions?

6. The United States may favorably influence policies of nations by facilitating technology transfer and, conversely, it may alienate nations by withholding or restraining technology transfer. To the extent that technology transfers facilitate meaningful improvements in U.S.

foreign relations with its adversaries, the transfers are in the interests of national security. However, if the improvements in relations are superficial or transitory, the United States may be incurring risks to its national security by transferring valuable technology to potential adversaries without commensurate benefits.

To what extent and under what conditions should the United States use technology transfers for foreign policy purposes, and what means should the Government use to insure the benefits from such transfers?

7. A foreign country's perception of its needs for technology often differs from the U.S. perception of that need and from the U.S. evaluation of the effects of such a technology transfer on American security.

What mechanisms presently exist for evaluating United States and other countries' perceptions of the need for technology transfers? What kind of mechanisms should be created to assess these perceptions to promote mutual accommodation between the perceptions of the United States and potential recipients?

Topic 4: The Benefits and Risks of Such Transfers

ISSUES

1. The Defense Science Board study, the "Bucy report," identified differing levels of effectiveness of various mechanisms. It stated that the more effective mechanisms required tighter controls than the less effective means. Only key factors to be considered in assessing technology transfer may be the relationship of the recipient country to the United States, the country's political stability, its geographic proximity to hostile countries, and the strategic importance of the particular technology.

What is the danger of loss of strategic U.S. technology to hostile foreign nations through the various forms of transfer?

What factors in addition to military should be taken into account in applying the test "may adversely affect the national security of the United States"?

To what extent should we take into account in export control decisions broader U.S. interests than those involved in the transactions themselves, e.g.:

(1) Decreased pressure on world supplies of scarce resources such as oil and gas resulting from transfer to the East of Western technology to exploit Eastern resources.

(2) Expansion of world food production.

(3) Participation in global efforts such as World Weather Watch.

2. U.S. military technology transferred to another nation may be employed to achieve internal stability: to redress an imbalance of regional power; or possibly for aggression. The recipient country may apply the U.S. technology in its relations with a mutual adversary, a neutral, or a U.S. ally. Some military technology can be used in defensive or offensive operations, so the regional cost/benefit calculation is very complex and filled with uncertainties.

The transfer of civil technology may be internally destabilizing if an inordinate amount of foreign exchange is used to buy the technology thereby hindering other economic or social programs, although the transfer of appropriate technology can aid development; increase employment, and promote economic, social, and political stability. A new technology may generate multiple positive as well as negative consequences in the local economy and environment. Agricultural mechanization can cause large-scale migration to urban areas where unemployment, hunger, and disease abound. The creation of an industrial base without a local supply of raw materials creates a dependency on

foreign countries for materials and, frequently, for export markets. A depressed world or regional market can threaten the economy of such a country and lead it to destabilizing actions. Technology transfers can also produce rising expectations, frustrations, and great social disruption. The development of labor-intensive technology can generate needed employment.

Do transfers of civil or military technology typically contribute to the stability of foreign nations and regions? Under what conditions? What role should intermediate technology play as an alternative to the transfer of large-scale, advanced technology? What would be the consequences for stability or instability of recipient nations of emphasizing transfer of appropriate technologies? What policies should the United States employ to promote economic growth in developing countries with due consideration for the nation's ability to absorb technology and acquire and allocate capital?

3. If the increased military capabilities make the foreign country more independent, then it may become a less dependable and loyal ally. If the military aid makes the foreign country more dependent, it may become a more dependable ally but would require continued U.S. technical assistance and logistic support. While these transfers may reduce the U.S. defense burden, they would also reduce the U.S. control of its military technology.

Some analysts suggest that the transfer of technology to another country creates an excessive demand for U.S. raw materials, spare parts, technical services, and even end items, thereby reducing America's own military capabilities. Others assert that by licensing U.S. technology and selling sophisticated systems, the United States reduces the item costs of military and industrial equipment and thus affords itself the development or purchase of more equipment.

Does technology transfer enhance U.S. military security by increasing allied military strength? Or are costs of transfers in items of equipment outflows so burdensome to the United States as to imperil national and military security?

4. By standardizing U.S. weapons and operating systems with those of U.S. allies, or at least making them interoperable, joint military operations are facilitated, mobilization and reaction times can be reduced, and logistic support will be improved and economized. However, direct U.S. control of its sophisticated technology is reduced, and the possibility of disclosure of strategic technology to a hostile power is increased.

To what extent do the standardization and interoperability of our allies' military equipment and systems benefit U.S. military security?

5. Providing nuclear energy technology to foreign nations decreases their reliance on fossil fuels, increases their industrial capacity, develops their economies, and thus builds their strength and stability. Under the Non-Proliferation Treaty the United States agreed to provide nuclear energy technology to signatories in exchange for their agreement to refrain from the acquisition of nuclear weapons. To meet the conditions of this treaty and maintain U.S. credibility, the United States must supply the necessary technology for the civil use of nuclear energy.

Some analysts hold, however, that the transfer of nuclear energy technology enhances the ability of foreign countries to produce nuclear weapons and increases the probability of nuclear proliferation.

What is the link between the transfer of nuclear energy technology and the proliferation of nuclear weapons? How does the proliferation of nuclear weapons affect U.S. military security? Under what conditions and with respect to what countries?

What do individual country case studies (that is, Canada, Japan, Australia) show in regard to such matters as the following:

(1) The dependency of the country's peaceful nuclear activities on transfers of technology from other countries, especially from the United States.

(2) The reactions of each country to efforts of the United States to regulate nuclear technology transfers in order to impede the spread of nuclear weapons capabilities.

(3) The policies and actions of each country to control its own exports of nuclear technology to other countries. **How do these policies and actions affect U.S. security aims?**

(4) To what extent might the transfer of technology for the discovery and subsequent mining of uranium ore to friendly countries contribute to the national security and energy resources of the United States?

6. Increasing China's industrial and military capabilities through technology transfers would probably tie down more Soviet military forces in Asia and could possibly reduce the Soviet threat to Europe, might help deter a Soviet military venture against China, and would probably increase Peking's interest in improving Sino-American relations. Such transfers might serve to increase U.S. leverage in dealings with the Soviets over sensitive issues such as SALT and force reductions in Europe. On the other hand, such transfers might damage U.S. efforts to achieve a détente with the Soviet Union and might dangerously increase the Sino-Soviet conflict. Increasing China's technological capabilities might also increase the threat to U.S. allies in Asia such as Japan, Korea, Taiwan, and the Philippines. Transfers even of civil technology might increase China's economic strength and enhance its ability to exert influence on its neighbors.

What are the costs and benefits of altering the Sino-Soviet power balance through technology transfers to China? What is U.S. policy and its rationale? What types of technology could be transferred to China with little risk, what types are prohibitively dangerous, and what types fall between these extremes?

7. Since the 1972 Shanghai communique, U.S. scientists have been visiting the People's Republic of China and Chinese scientists have visited the United States.

How do scientific and technical exchanges between the United States and China contribute to the development of the People's Republic of China? Could it contribute to Chinese military potential? If so, how would such technology transfers affect U.S.-U.S.S.R. relations?

8. Since the withdrawal of Soviet technicians from People's Republic of China, China has been edgy about accepting aid from abroad.

How does China's attitude affect receptivity by People's Republic of China to U.S. technical transfer matters? What are the implications of China's attitude for U.S. technology transfer policy? To what extent and in what ways does the growing military strength of People's Republic of China impair or contribute to U.S. national security?

9. In some developing countries, the industrial base is controlled by a small group of powerful and wealthy men (government leaders in some cases). Transfers of sophisticated technology to such countries may tend to enhance the power of these few individuals, further centralize the economic and political systems within the country, and decrease the prospects of democratic capitalism. However, national

stability can also be enhanced by **economic and technological development that primarily benefits the low-income portion of the population.**

What are the implications for U.S. interests of the effect of technology transfers on the internal economic and political patterns of developing nations?

10. Technology transfer controls tend to serve as disincentives to U.S. innovation and international sharing of technology; they tend to deter rather than to encourage such processes.

What are the long-term effects on the U.S. technological posture (i.e. the balance of technology, diffusion, and the rate of innovation) of U.S. technology transfer controls?

11. The relationship between the United States and the Soviet Union, i.e., the policy of détente, implies a linkage among security, economic, and political factors. Thus, the net economic benefits of technological exchange programs may be related to political and security considerations.

What are the dominant considerations in American policy assessments of United States-Soviet Union cooperative science and technology programs? How should the benefits and costs among and within programs be assessed? What new mechanisms might be introduced to facilitate this assessment process?

12. The Soviet Union is one of the largest producers of petroleum in the world and has vast natural gas reserves which are likely to be increasingly proven and brought into production. Imports of U.S. energy technology—submersible pumps, drilling equipment, and offshore platforms, for example—may be critical to continued effective exploration, development, and exploitation of Soviet energy resources. Exporting U.S. energy technology critical to Soviet energy development presents policy options—such as withholding or restricting exports—and raises questions of national interest—such as whether U.S. energy technology exports could enhance the Soviet military and industrial sector.

Does the export of commercially available U.S. energy technology to the Soviet Union impact on critical military security as well as national security questions?

13. Recent Western technology transfers to the Soviet Union suggest that considerable domestic investment is frequently required to insure adoption of imports of technology. At the same time, Western technology transfers release some Soviet resources, which can then be diverted to other sectors.

Will the Soviets find that imported technology is more resource-demanding or more resource-releasing? What impact does the importation of Western technology have on the domestic investment allocation of the recipient nation?

14. The needs, priorities, and resources of the LDC's sometimes conflict with those of the developed countries. Information on these issues may be provided in the National Review Papers required of the LDC's for the U.N. Conference on Sciences and Technology for Development.

How would the restructuring of trade and technology transfer systems as proposed by the LDC's affect the U.S. domestically in terms of labor, small business, and industry? How realistic are the demands of the LDC's likely to be in this regard, and what steps might the United States take to make LDC expectations more realistic? To what extent do LDC proposals conflict with the goals of U.S. interest groups and how can the Government alleviate such conflicts?

15. In interacting with the U.S.S.R. (and other nations with comparable systems), the United States is dealing with a state monopoly,

unlike its dealings with Western countries and Japan. A central issue to be examined in this context might be the implications for the United States of the economic priorities imposed by a state monopoly, e.g., artificial limitations on foreign trade in areas such as consumer goods in which there may be tremendous internal demand, while promoting transactions only in areas such as advanced technology as defined by political/military priorities.

What is the impact of such systemic differences on U.S. interaction in science, technology, and trade with such nations? Should the analysis of technology transfer take into account those systemic differences as a central feature?

Are U.S. corporations at a disadvantage in dealing with state monopolies? How might the U.S. Government further help U.S. corporations in such dealings?

Topic 5: Trends in Technology Transfers by the United States and Other Countries

ISSUES

1. To assess past and current technology export policies and to be able to recommend new policies, the Congress needs considerable data on such transfers.

What is the status of the Government's data base concerning past technology transfers?

2. Many aspects of technology transfer remain ambiguous; trends and implications are unclear.

What additional measurement devices should be applied to the analysis of U.S. technological trends and the trends in international technology transfers? What are valid measurements of the diffusion and application of technology that is transferred from one nation to another? What are the parameters to be measured to clarify technology transfer trends and implications (monetary costs, other economic factors, social impacts, future consequences)? Precisely what information about the trends and implications of technology transfers is critical to policymaking and how might such information be utilized by the Congress?

3. Many industrialists hold that if the United States does not sell sensitive technology to a foreign buyer, some other developed nation will.

What degree of international competition and cooperation has there been in the technology market? What portion of international sensitive exports are consummated by the United States? Which are the other leading countries? What are the recent trends in this distribution? Are there areas in which the United States has no foreign competition?

4. Some analysts believe that an increasing volume of advanced technology is being exported from the United States and other Western countries which may have serious impacts on international stability, peace, and U.S. security.

What portion of international technology exports have significant military implications? What have been the trends? What is the American experience in exporting sensitive or critical technology?

5. Some officials justify transfers of military technology on the theory that such transfers will stabilize regional conditions and enhance the prospects for peace; some analysts blame such technology transfer policies for the outbreak of hostilities and internal disorders.

Is there a correlation between the trends in international technology transfers and world stability? What are the facts? Can the various transfers of sensitive technology be differentiated, in the sense that some kinds are stabilizing and others destabilizing? To what extent does the economic burden of maintaining weaponry donated or sold by the United States to LDC recipients handicap their economic development?

6. Soviet transfers of military technology to allies and clients have shifted from aid toward sales. The sales have tended to reduce Soviet control in client countries and raise the sophistication of the transferred technologies.

Do increasing sales of sophisticated arms by the Soviet Union provide significant new opportunities and risks to our security; that is, do sales provide opportunities to assess Soviet developments in weaponry or do they create risks that sophisticated weapons in the hands of politically unstable Soviet clients may further endanger the peace in various regions? Should limitations on arms sales be related to agreements on sales of civilian transfers in the Soviet Union? Should agreements on sales of civilian nuclear reactors to various nations be based on joint Soviet-American, as well as international agreements in order to avoid proliferation of nuclear technology that might be translated into military uses? Could there be benefit in purchasing advanced Soviet technology, often military related, through third countries in order to extract the technology or to develop countermeasures?

7. U.S. efforts to achieve effective control of international traffic in nuclear energy technology have not met with the full cooperation of other supplier states.

To what extent are other supplier states following a policy of controlling exports of nuclear technology in order to impede the spread of nuclear weapons capabilities to additional countries? Are there instances in which the policies or actions of other supplier countries are at variance with the aims of non-proliferation espoused by the United States? What efforts are being made by the United States and other supplier countries to harmonize their policies on nuclear exports?

Topic 6: The Need for Controls on Transfers of Technology

ISSUES

1. Controls on U.S. exports of nuclear technology, military technology, and other sensitive technology should provide protection against acquisition of the technology by a hostile foreign power.

In what cases have existing regulations failed to provide such protection? What were the security implications of the technology losses? What additional controls could have prevented the loss? How can the Government distinguish the kinds of technology that should not be transferred? What criteria should be applied and how do they differ from past criteria? In considering the test "make a significant contribution to the military potential", to what extent should past experience of demonstrated adverse application be determining? To what extent should prototype as compared with serial production in potential recipient countries be determining?

2. There is a large measure of agreement, that nuclear weapons technology is so critical to U.S. security that no export can be allowed.

How effective can controls of nuclear technology be? What can they be reasonably expected to accomplish and at what cost? Are there other forms of technology that should be given similar protection?

3. Other Western countries tend to be less restrictive than the United States in controlling high-technology exports to Communist countries.

Are Western European countries and Japan considered likely conduits of high technology to the East? Are tighter controls on U.S. exports to Western countries needed? Are CoCom export controls adequate?

4. U.S. multinational corporations are among the most active means of transfer of U.S. technology to foreign countries.

Are additional Government controls on the foreign economic activities of multinational corporations needed? In particular, is more Government regulation of foreign investment or technical information exchange by U.S.-based firms needed or do current government constraints limit U.S.-based firms competitiveness?

5. Leaders in many developing countries have complained about the basic ground rules under which technology is transferred in the present international economic system. They have proposed changes in the international economic order which would provide the developing countries with greater access to industrial technologies at lower cost.

Should the U.S. Government intervene in private commercial transfers of technology to developing countries, in order to insure that industrial technologies make a greater contribution to the development process? If so, how? Should the U.S. Government endorse proposals for a binding code of conduct for international technology transfers? What actions can the U.S. Government take to help developing countries absorb technology more effectively?

6. U.S. technology is largely in the hands of corporations. The private sector selectively transfers technology, in response to the foreign market demands and its own capabilities, to earn profits which help support the U.S. economy. Many businessmen argue that the Government should support technology transfer programs that boost the American economy or at least should adopt a policy of *laissez faire*. However, some transfers have direct or indirect implications for U.S. security, so the Government has become involved in facilitating or restricting certain types of technology transfer.

Can and should the Government effectively control the transfer of technology given the private commercial orientation of U.S. technology and the intangible form of much technology? Do Government regulations excessively hinder innovation and U.S. competitiveness in the private sector and create antagonistic relations between industry and Government? Does current government involvement in the technology process reflect the appropriate balance between private sector and public sector interests?

7. U.S. security is based on a collective defense system and depends on the strength of U.S. allies.

Do the present U.S. restrictions on technology transfers allow U.S. allies to acquire the technology necessary to develop their military and industrial strength?

8. The Soviet Union has a very uneven approach to technological change. The Soviet military sectors generally stay abreast of the world level of technology, they innovate and absorb technology well, and export products and processes to allies and client nations. Soviet civilian sectors generally lag behind the world's level of technological development; they innovate and absorb technology poorly. Moreover, the Soviet Union imports products and processes from advanced Western, industrial nations who are likely adversaries or competitors.

How may the sale of selected items of high technology or their transfer through cooperative agreements best be controlled to avoid significant improvements in a potential adversary's military capability? Is indirect leakage of advanced technology from lesser adversaries or friendly nations to the Soviet Union a major problem? Is it within the power of the United States to control third country transfers?

9. Such countries as Japan and West Germany have successfully absorbed U.S. technology and used it to improve their competitive position in international markets. Some observers believe that the transfer of technology to such countries has contributed to U.S. balance of trade deficits.

Is it in the U.S. national interest to limit transfers of commercial technology for politically and economically competitive reasons? Would such action invite retaliation by foreign governments? To what extent could other countries, particularly low wage, developing countries, successfully absorb U.S. technology and pose competitive threats to U.S. exports?

10. There is increasing concern among U.S. labor leaders that the export of U.S. technology to foreign countries, where it may be combined with lower-cost labor, is contributing to a loss of jobs and income in U.S. domestic industry.

Should the Government impose restrictions on technology transfers which generate domestic economic dislocations? Do employment and income gains in technology exporting industries compensate for losses in industries adversely affected by increased foreign competition?

11. It is asserted that the international trade competitiveness of U.S. firms can be maintained without restrictions on international technology transfers, if Government plays a more active role in fostering domestic technological and economic growth.

Should Government research and development spending be increased? Should the Government provide additional incentives for private R. & D. and modernization? Is there any evidence that such activities are effective in stimulating U.S. competitiveness as well as in counteracting military threats posed by international technology transfers?

12. Some U.S. Government programs, such as Export-Import Bank credits, investment guarantees, and tax incentives for exporters (DISC), promote the export of U.S. technology.

Do special incentives for technology exports create distortions in the domestic marketplace and "push" U.S. technology abroad excessively? Should such incentives be eliminated?

13. Some foreign governments, particularly those in developing countries, intervene in commercial negotiations on licensing, foreign investment, and other technology transfer arrangements in order to enhance the bargaining power of recipient enterprises.

Do U.S. technology sales earn adequate profits when exported abroad, particularly to countries whose governments exert controls over imports? Are U.S. exporters compensated adequately for R. & D. costs and costs of transferring technology? If it is indeed true that technology sold abroad is underpriced, what policy action is available to the U.S. Government to correct this? Should the U.S. Government intervene? If so, how?

14. Industrial cooperation arrangements, involving long-term ties and extensive personal contacts, have usually been the most effective means of conducting commercial technology transfers.

In what context should the U.S. Government encourage technology exports suited for developing more active mechanisms involving transfers of know-how, and less concerned with mechanisms for export of products? Should these mechanisms be more formalized than they are now?

15. The mechanisms of technology transfer are important to both the exporter and recipient nations. The most effective form for transfer is the "active" system transfer, involving people as well as products.

Soviet leaders would like to limit imports of this form because such imports breach their control and security systems. The United States has an interest in controlling these effective transfers as they may have especially significant effects on Soviet economic performance.

What policy guidelines can be developed in the area of export licensing which take into account export risks and gains of various exporting mechanisms. Under what conditions should the most effective transfer mechanisms be used in U.S.-U.S.S.R. transactions?

16. East-West technological interdependence is an important issue. U.S. science and technology exchanges are based on an assumption of mutual benefit.

What are the U.S. technology transfer policies relating to the importation of technology from the socialist economies? Are there other informational benefits to be gained from foreign trade, industrial cooperation, and bilateral science and technology exchanges? What technology do we import from the East?

Topic 7: The Effectiveness of Existing Organizational Arrangements in the Executive Branch in Regulating Technology Transfers from the United States

ISSUES

1. To effect meaningful controls, U.S. agencies must be able to monitor the use and further transfer of advanced U.S. technology which has been provided to a foreign country.

Are U.S. intelligence collection and analysis capabilities sufficient to identify the misuse or improper allocation of U.S. technology?

2. In the past the United States has relied on unilateral controls on advanced technology to avoid undesirable technology transfers. For those technologies that the United States does not monopolize, control depends on being able to achieve multilateral agreement with other supplier nations. Other supplier nation policies (or lack of policy) governing exports of critical technology often differ from ours. They either do not perceive the security implications of their technology transfers, or believe that economic/political factors outweigh them, or measure their national security on a different scale, or have an inherent distrust of U.S. policy. Whatever the answer(s), the ability to control critical technology transfers to either Communist countries or to LDC's will be affected by the policy and perceptions of other Western supplier nations. It is important, therefore, in developing U.S. policy to understand the political and economic motivations of industrial supplier nations for transferring technology, and whether they are likely to be long or short term in duration.

Can Western technology transfer policy be coordinated? Is a reform of the Coordinating Committee (Cocom) procedure likely to meet the needs? Are Western policies so diverse and contradictory that a unilateral U.S. policy of denial or restriction is no longer likely to be effective? What alternative courses of action are open to the United States?

3. Most technology export decisions are made in the Department of Commerce, but some are made in the Department of State, in the White House, or in other Federal agencies. Numerous other govern-

ment agencies, including the Department of Defense, make important contributions to the decisions concerning the military and security implications of such transfers. It is possible that the national security implications of some technology transfers may be overlooked because of the lack of a central authority. Centralization may, however, create undue government expense and an administrative bottleneck to the decision process. Perhaps an improvement in coordination is called for and would suffice. Currently, there are a half dozen agencies responsible for controls of U.S. technology transfers. Transfers to the Communist countries are controlled by one system of bureaucracy, nuclear exports another, and munitions and military related commodities by yet another. Agencies such as DOD, DOE, and NASA deal directly with other nations under bilateral agreements for cooperation in some areas of advanced technology with only self-imposed controls.

How do each of these bureaucratic control systems operate intra and inter-agency and where do they duplicate or overlap in their functions? Specifically, how does each control system collect, store, and retrieve information on past transfers, and how is such data utilized in the licensing process and in the development of new technology transfer policy. How might new organizational arrangements eliminate duplications and deficiencies of existing control systems?

4. The U.S. Arms Control and Disarmament Agency is responsible for formulating U.S. Government arms control and disarmament policy. It has been given a substantive role in executive policy and decisionmaking organizations relating to the arms control aspects of exports of armaments and munitions. It is not clear to what extent ACDA participates in policy decisions regarding transfers of other technology that could have an impact on national arms control and disarmament policy. These decisions would relate to exports of nuclear facilities and materials, and to exports of other nonmilitary commodities (for example, advanced computers) that could be significant from an arms control policy viewpoint.

What role and responsibilities does ACDA have in executive branch mechanisms controlling exports of armaments, nuclear facilities, materials and technology, and other high technological items that could have an arms control relevance? Do other departments and agencies such as the Defense Department and the State Department consider arms control factors in making executive decisions regulating technological exports? What improvements might be in order to give arms control policy factors an appropriate weight in such decisionmaking?

5. Long-term commercial transfers of technology to Soviet end users by private American firms may be among the most effective U.S. vehicles for influencing Soviet economic performance. At present, there appears to be inadequate coordination among the agencies of the U.S. Government and private commercial interests. Factual information about private transactions of U.S. firms with the U.S.S.R. is sparse. Likewise, the executive and legislative branches of Government have not developed an agreed Federal policy or mechanism for coordination with the private sector.

What effective legal and administrative options are open to the Congress and the executive branch to develop a coordinated policy on private, commercial transfer of technology? How can a Federal policy best be communicated to the private commercial sector and administered? Specifically, are new legislation or new administrative mechanisms needed to provide a means of governmental

intervention in private foreign commercial relations? What initiatives might the Department of State undertake to improve the data base of international transactions? Would there be a role here for the Departments of Treasury and Commerce?

Topic 8: The Adequacy of Existing Legislation and Regulations With Respect to Transfers of Technology From the United States

ISSUES

1. In some cases the existing technology transfer control system may fail to identify technology transfers that carry serious military implications although they do not involve lethal systems or classified information. Perhaps revision of the U.S. Munitions List and/or other export control lists is warranted, not necessarily increasing the number of items covered, or some other mechanism adopted, so that national security considerations will be routinely included in the decision process.

Do legislation and regulations adequately provide for the identification of strategic technology and insure that national security implications are properly considered by the bureaucracy? What changes are required?

2. Technology transfer policies in the various agencies of the Government are not adequately coordinated. Detailed guidance may not be feasible because of the diverse nature of technology transfers and recipients, but a policy statement could provide guidance on the consideration of security, political, and economic factors and a statement of relative priorities. Alternatively, a brief statement of general policy could be accompanied by very detailed specific instructions.

What are U.S. technology transfer policies? How specific should regulations and legislation be? Can policy be uniform across the board or should it be country-specific, item-specific, or technology-specific?

3. The U.S. Munitions List identifies all defense articles for which the President is authorized to control the export and import. Some items on the list have significant civilian applications and some items of strategic importance to the United States are not on the list?

Should the U.S. Munitions List include fewer or more items? Is there a meaningful and useful categorization that can be applied to the items on the list (for example, offensive/defensive, lethal/nonlethal, weapon/weapon-related/non-weapon, critical/noncritical, strategic, advanced, sophisticated, significant, obsolete, obsolescent)?

Topic 9: The Possibilities for International Agreements With Respect to Transfers of Technology

ISSUES

1. President Carter's announced policy of restraining arms sales and coproduction agreements included the objective of obtaining the cooperation of other supplier states and recipient states. It has not been shown that U.S. unilateral restraints or other efforts will lead to such cooperation. In general, the United States cannot by itself effectively control the international transfer of technology but needs the cooperation of other nations.

What actions by the United States are likely to promote international cooperation in restraining the international flow of technology that is considered destabilizing or detrimental to U.S. interests? What are the motivations which prompt foreign nations to promote or restrict the transfer of various technologies? What other goals might be sought in international agreements regarding technology transfer? Given the difficulties of controlling data flow as such, the lack of legislative authority to control technical data in several Western countries, and the usual presence of equipment in significant technological transfers: should the U.S. urge other countries to adopt more formalized controls on the transfer of technical data or concentrate efforts on tightening multi-lateral controls on keystone items of production equipment related to critical technologies?

2. In the United Nations Conference on Trade and Development (UNCTAD) meetings the United States has supported the establishment of voluntary international guidelines for technology transfer rather than mandatory rules. The possible effectiveness of nonbinding and voluntary guidelines is questionable. However, it is also doubtful that a legally binding agreement could be strictly enforced.

What should be the nature and scope of proposed guidelines for international technology transfers (code of conduct for technology transfers)?

3. Science and technology exchange agreements are becoming increasingly prominent in the United States-Soviet relations.

Should the United States make further science and technology exchanges contingent on the principle of joint research? Is an emphasis on exchanges of basic research rather than industrial applications prudent in terms of safeguarding national security and proprietary interests? How should exchange activities be financed? How should information generated by such activities be disseminated? How can the language barrier be overcome? How does the United States assure itself of a quid pro quo? Is the quality of Soviet science relative to U.S. science sufficient to justify joint cooperation? What benefits accrue from these agreements?

4. The U.N. Conference on Science and Technology for Development raises questions concerning the interrelation of science and technology with economic and social development.

What current U.S. policies toward technology transfers and foreign assistance may be affected by U.S. participation in a worldwide effort at helping the LDC's develop?

5. Certain international arrangements now exist and there have been a variety of proposals made for additional international arrangements to facilitate and to control nuclear transfers.

What international agreements and arrangements now exist that regulate international transfers of nuclear technology? What are the purposes of these arrangements and how successful have they been in achieving them? What has been the record of U.S. participation in these arrangements? What is the desirability of establishing additional international regimes governing transfers of nuclear technology among nations? In particular, how effective have the International Atomic Energy Agency, the International Energy Agency, and the Nuclear Agency of the OECD been in providing for the international transfer of nuclear technology? How effective have they been in preventing the transfer of dangerous nuclear technology? Should the United States share its nuclear weapons security and nuclear fuel cycle safeguards and security technologies with other nuclear nations in the military security interests of the United States?

6. One element of military security is reliable high-resolution remote sensing satellites—"spy in the sky." It is of benefit to the security of the United States to be able to detect with assurance any threaten-

ing mobilization and to go from macrosurveillance to detailed or microsurveillance of suspected activities. Remote sensing technology has many important nonmilitary-related purposes such as weather monitoring, crop monitoring, and mineral detection.

What is the U.S. Government's net assessment of the advisability of transferring reconnaissance satellite technology? Are there possibilities for international agreements for the protection of reconnaissance satellites or for sharing certain reconnaissance information and technology?

RELATED LEGISLATIVE REQUIREMENTS

The Export Administration Amendments of 1977 and the International Security Assistance Act of 1977 reflect the increasing concern of the Congress over administering an efficient export control procedure which would insure an orderly marketing of U.S. exports, thereby strengthening the international competitive position of the United States while at the same time taking into account the national security and military implications of international technology transfers.

To encourage a more thorough examination of U.S. export control policy the two Acts require the executive branch to study and report to Congress on: (1) The national security and military implications of international technology transfers; (2) the impact of current exporting patterns on the international competitive position of the United States in advanced industrial technology; (3) possible measures to facilitate the export control process by simplifying and clarifying rules and regulations; (4) the effectiveness of multilateral export controls (the Cocom list); (5) modifying both the unilateral and multilateral control lists to include only those articles and materials which would make a significant contribution to the military potential of any country threatening or potentially threatening the national security of the United States (bring into practice the "Bucy report" recommendations).¹

Interest in the impact of technology transfer has not been limited to the United States. The OECD, for example, has been examining the transfer of technology between East and West to examine what issues of policy it may raise for OECD governments.

A more specific discussion of U.S. studies to be conducted, interagency reviews and reports to Congress as required by Public Law 95-92 (International Security Assistance Act) and Public Law 95-52 (Export Administration Amendment of 1977) follows:

STUDIES TO BE CONDUCTED

1. Public Law 95-92 (International Security Assistance Act of 1977) section 24 (a) requires the President to conduct a comprehensive study of the policies and practices of the U.S. Government with respect to the national security and military implications of international transfers of technology in order to determine whether such policies and practices should be changed.

2. Public Law 95-52 (Export Administration Amendments of 1977) section 119 requires the President, acting through the Secretary of Commerce, Secretary of Labor, and the International Trade Commission to conduct a study of the domestic economic impact of exports from the United States of industrial technology whose exports requires a license under the Export Administration Act of 1969. Such a study must include an evaluation of current exporting patterns on the international competitive position of the United States in advanced industrial

¹For a more thorough explanation of the "Bucy report" and the role of the Department of Defense in controlling exports of advanced technology, see the statement of Dr. Ellen Frost, Deputy Assistant Secretary of Defense before the Subcommittee on International Economic Policy and Trade, U.S. Congress, House Committee on International Relations, Oct. 25, 1977.

technology fields and an evaluation of the present and future effect of these exports on domestic employment.

3. Public Law 95-52 (Export Administration Amendments of 1977) section 120 requires the Secretary of Commerce to conduct a study of the transfer of technical data and other information to any country to which exports are restricted for national security purposes and the problem of the export, by publications or any other means of public dissemination, of technical data the export of which might prove detrimental to the national security or foreign policy of the United States.

INTERAGENCY REVIEW

1. Public Law 95-52 (Export Administration Amendments of 1977) section 114 requires the Secretary of Commerce, in consultation with appropriate U.S. Government departments and agencies to review the rules and regulations issued under Public Law 95-52 and the lists of articles, materials and supplies which are subject to export controls in order to determine how compliance can be facilitated by simplifying such rules and regulations, or by simplifying or clarifying such lists.

REVIEW BY THE PRESIDENT

1. Public Law 95-52 (Export Administration Amendments of 1977) section 103 requires the President to periodically review the U.S. export policy toward individual countries to determine if U.S. policy is appropriate, taking into account such factors as the country's present and potential relationship with the United States, its present and potential relationship to countries friendly or hostile to the United States, and its ability and willingness to control retransfers of U.S. exports in accordance with U.S. policy.

REPORTS TO CONGRESS

1. Public Law 95-92 (International Security Assistance Act of 1977) section 24(c) requires the President to submit to the Congress a report setting forth in detail the findings and conclusions of the study conducted pursuant to section 24(a) (study of technology transfers) together with recommendations for legislation and administrative action no later than August 1978.

2. Public Law 95-52 (Export Administration Amendments of 1977) section 103 requires the President to report to Congress no later than December 31, 1978, in the semiannual report of the Secretary of Commerce the results of his review of U.S. export policy toward individual countries (as required by Public Law 95-52 section 103) together with the justification for U.S. policy.

3. If the President exercises the authority conferred by Public Law 95-52 section 106 prohibiting or curtailing the exportation of any agricultural commodity, he shall immediately report such action to the Congress, setting forth the reasons in detail. If the Congress, within 30 days of receiving the report, adopts a concurrent resolution disapproving such action then, the prohibition or curtailment shall cease to be effective.

4. Public Law 95-52 (Export Administration Amendments of 1977) section 114 requires the Secretary of Commerce to report to Congress on actions taken on the basis of the Secretary's review of export regulations and lists (as required by 95-52 section 114) not later than June 1978.

5. As required by Public Law 95-52 (Export Administration Amendments of 1977) section 117, the President shall submit to Congress no later than June 1978 a special report on multilateral export controls in which the United States participates pursuant to the Export Administration Act of 1969 and the Mutual Defense Assistance Control Act of 1951. The purpose of this report shall be to assess the effectiveness of such multilateral export controls and to formulate specific proposals for increasing the effectiveness of such controls.

6. Public Law 95-52 (Export Administration Amendments of 1977) section 118 requires the Secretary of Commerce, in cooperation with appropriate U.S. Government departments and agencies, to undertake an investigation to determine whether the U.S. unilateral controls or multilateral controls in which the United States participates should be removed, modified or added to protect the national security of the United States. Such an investigation should take into account such factors as the availability of such articles, materials and supplies from other nations and the degree to which the availability of these articles and materials would make a significant contribution to the military potential of any country threatening or potentially threatening the national security of the

United States. The results of this investigation shall be reported to Congress no later than December 31, 1978.

7. Public Law 95-52 (Export Administration Amendments of 1977) section 119 requires the President, acting through the Secretary of Commerce, the Secretary of Labor and the International Trade Commission, to report the results of the Technology Export study as required by Public Law 95-52 section 119 by June 1978.

8. Public Law 95-52 (Export Administration Amendments of 1977) section 120 requires the Secretary of Commerce to report to Congress by June 1978 his assessment of the impact of the export of technical data and other information on the national security and foreign policy of the United States and his recommendation for monitoring such exports without impairing freedom of speech, freedom of press, or the freedom of scientific exchange.

APPENDIX 1

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APPENDIX 2

CONTRIBUTING CONGRESSIONAL RESEARCH SERVICE STAFF MEMBERS

Economics Division.—George Holliday.

Foreign Affairs and National Defense Division.—Don Alderson, Robert Bell, Vita Bite, Alva Bowen, Louella Christopher, Richard Eisenman, Ted Galdi, Mark Lowenthal, Clyde Mark, Jonathan Medalia, Allan Nanes, Charlotte Phillips, Robert Shuey, Larry Storrs, Robert Sutter, William Whitson, Joel Woldman, and Jim Wootten.

Science Policy Research Division.—Walter Hahn, Claire Geier, Geneveive Knezo, and Wendy Schacht.

Senior Specialist Division.—Ronda Bresnick, Warren Donnelly, Charles Gellner, John Hardt, Frank Huddle, and William Inglee.

Office of Coordination and Review.—James Sayler and James Robinson.

Office of Research and Analysis.—Elizabeth Yadlosky.

Clerical Support.—Elizabeth A. Brown, Janet Bullock, Beverly Childers, Elizabeth Hoover, Kathy Hume, Sandra Hunt, Louisiana Jones, Cheryl Powell, Mary Radtke, and Dale Shirachi.

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